CLAIMS

1. A computer-based method for adding a participant to a network of participants, each participant being connected to three or more other participants, the method comprising:

identifying pair of participants of the network that are connected;

disconnecting the participants of the identified pair from each other; and

connecting each participant of the identified pair of participants to the added participant.

2. The method of claim 1 wherein each participant is connected to 4 participants.

3. The method of claim 1 wherein the identifying of a pair includes randomly selecting a pair of participants that are connected.

4. The method of claim 3 wherein the randomly selecting of a pair includes sending a message through the network on a randomly selected path.

5. The method of claim 4 wherein when a participant receives the message, the participant sends the message to a randomly selected participant to which it is connected.

6. The method of claim 4 wherein the randomly selected path is approximately proportional to the diameter of the network.

7. The method of claim 1 wherein the participant to be added requests a portal computer to initiate the identifying of the pair of participants.

8. The method of claim 7 wherein the initiating of the identifying of the pair of participants includes the portal computer sending a message to a connected participant requesting an edge connection.

9. The method of claim 8 wherein the portal computer indicates that the message is to travel a certain distance and wherein the participant that receives the message after the message has traveled that certain distance is one of the participants of the identified pair of participants.

10. The method of claim 9 wherein the certain distance is approximately twice the diameter of the network.

11. The method of claim 1 wherein the participants are connected via the Internet.

12. The method of claim 1 wherein the participants are connected via TCP/IP connections.

13. The method of claim 1 wherein the participants are computer processes.

14. A computer-based method for adding nodes to a graph that is m-regular and m-connected to maintain the graph as m-regular, where m is four or greater, the method comprising:

identifying p pairs of nodes of the graph that are connected, where p is one half of m;

disconnecting the nodes of each identified pair from each other; and

connecting each node of the identified pairs of nodes to the added node.

15. The method of claim 14 wherein identifying of the p pairs of nodes includes randomly selecting a pair of connected nodes.

16. The method of claim 14 wherein the nodes are computers and the connections are point-to-point communications connections.

17. The method of claim 14 wherein m is even.

18. A method of initiating adding of a participant to a network, the method comprising:

receiving a connection message from the participant to be added; and

sending a connection edge search message to a neighbor participant of the participant that received the message wherein the connection edge search message is forwarded to neighbor participants until a participant that receives the connection edge search message decides to connect to the participant to be added.

19. The method of claim 18 wherein the sent connection edge search message includes an indication of the number of participants to which the connection edge search message should be forwarded.

20. The method of claim 19 wherein the number of participants is based on the diameter of the network.

21. The method of claim 19 wherein the number of participants is approximately twice the diameter.

22. The method of claim 18 wherein when a participant decides to connect to the participant to be added, the neighbor participant that sent the connection edge search message to the participant that decided to connect also decides to connect to the participant to be added.

23. The method of claim 18 wherein participants that receive the connection edge search message forward the connection edge search message to a randomly selected neighbor.

24. A method in a computer system for connecting to a new participant of a network, the method comprising:

receiving at a participant a connection edge search message;

identifying a neighbor participant of the participant that received the connection edge search message;

notifying the neighbor participant to connect to the new participant;

disconnecting the participant from the identified neighbor participant; and

connecting the participant to the new participant.

25. The method of claim 24 including determining whether the participant is the last participant in a path of participants through which the connection edge search message was sent.

26. The method of claim 25 wherein when the participant is not the last participant in the path, sending the connection edge search message to a neighbor of the participant.

27. The method of claim 26 including randomly selecting the neighbor participant to which the connection edge search message is to be sent.

28. The method of claim 24 wherein the received connection edge search message includes an indication of the number of participants through which the connection edge search message is to be sent.

29. The method of claim 24 including when the participant is already a neighbor of the new participant, sending the connection edge search message to a neighbor participant of the participant.

30. The method of claim 24 wherein the participants are computer processes.

31. The method of claim 24 wherein the connections are point-to-point connections.

32. A computer-readable medium containing instructions for controlling a computer system to connect a participant to a network of participants, each participant being connected to three or more other participants, the network representing a broadcast channel wherein each participant forwards broadcast messages that it receives to its neighbor participants, by a method comprising:

identifying a pair of participants of the network that are connected;

disconnecting the participants of the identified pair from each other; and

connecting each participant of the identified pair of participants to the added participant.

33. The computer-readable medium of claim 32 wherein each participant is connected to 4 participants.

34. The computer-readable medium of claim 32 wherein the identifying of a pair includes randomly selecting a pair of participants that are connected.

35. The computer-readable medium of claim 34 wherein the randomly selecting of a pair includes sending a message through the network on a randomly selected path.

36. The computer-readable medium of claim 35 wherein when a participant receives the message, the participant sends the message to a randomly selected participant to which it is connected.

37. The computer-readable medium of claim 35 wherein the randomly selected path is approximately twice a diameter of the network.

38. The computer-readable medium of claim 32 wherein the participant to be added requests a portal computer to initiate the identifying of the pair of participants.

39. The computer-readable medium of claim 38 wherein the initiating of the identifying of the pair of participants includes the portal computer sending a message to a connected participant requesting an edge connection.

40. The computer-readable medium of claim 38 wherein the portal computer indicates that the message is to travel a certain distance and wherein the participant that receives the message after the message has traveled that certain distance is one of the identified pair of participants.

41. A method in a computer system for connecting to a participant of a network, the method comprising:

receiving at a participant a connection port search message sent by a requesting participant; and

when the participant has a port that is available through which it can connect to the requesting participant,

sending a port connection message to the requesting participant proposing that the requesting participant connect to the available port of the participant; and

when the participant receives a port proposal response message that indicates the requesting participant accepts to connect to the available port, connecting the participant to the requesting participant.

42. The method of claim 41 including:

when the participant does not have a port that is available through which it can connect to the requesting participant, sending the connection port search message to a neighbor participant.

43. The method of claim 41 wherein a port is available when the requesting participant is not already connected to the participant and the participant has an empty port.

44. A method in a computer system of detecting neighbors with empty ports condition in a network, the method comprising:

receiving at a first participant a connection port search message indicating that a second participant has an empty port; and

when the first participant is already connected to the second participant and the first participant has an empty port, sending a condition check message from the first participant to the second participant wherein the condition check message identifies neighbors of the first participant.

45. The method of claim 44 including:

when the second participant receives the condition check message,

when the second participant does not have the same neighbors as the first participant, sending a condition repair message to third participant that is a neighbor of the first participant but is not a neighbor of the second participant.

46. The method of claim 45 including:

when the third participant receives the condition repair message,

disconnecting from a neighbor of the third participant other than the first participant; and

connecting to the second participant.

47. The method of claim 44 including:

when the second participant receives the condition check message,

when the second participant has the same neighbors as the first participant, sending a condition double check message to a third participant that is a neighbor of the second participant.

48. The method of claim 47 including:

when the third participant receives the condition double check message,

when the third participant does not have the same neighbors as the first participant, sending a condition check message to a fourth participant that is not the first participant or the second participant.

49. The method of claim 48 including:

when the fourth participant receives the condition check message,

sending a condition repair message to a fifth participant directing the fifth participant to connect to the first participant or the second participant.